US Army Corps of Engineers
Waterways Experiment Station

Soil Mechanics Information
SMIAC
Analysis Center

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Large Deformations in Soil

Many practical problems in soil mechanics involve large deformations that cannot be analyzed properly with existing analytical tools. Such problems include designing large flexible structures, predicting movements caused by induced excess pore pressures, interpreting data from cone penetration and other in situ test devices, and laboratory tests. Presently, these problems are analyzed using theories intended for small deformations or by empirical techniques, both of which are inadequate to develop comprehensive design and analysis criteria. Although development of large strain analysis is possible by the use of powerful computers, a better physical understanding of large deformations in soils is needed before improved computational tools can be developed and applied.

The Geotechnical Laboratory at the Waterways Experiment Station is developing a theory for large deformations of soil that could represent a fundamental advance in theoretical soil mechanics. Experiments to validate the theory will concentrate on defining the proper characterization of stress and strain when specimens are subjected to large strains and rotations. Improved computer codes using cone penetration data will be used to analyze practical problems. Among the applications is the analysis of the dynamic response of dams to earthquake ground motions. Accurate prediction of earthquake-induced deformations is the key to making well-informed seismic safety and remediation decisions for embankment dams.

Point of contact for this technology is Dr. John F. Peters, telephone 601-634-2590.

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The SMIAC Bulletin is published and distributed periodically. Please contact the Director of SMIAC for more information:

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PARTIAL LISTING OF EXPERTS
GEOTECHNICAL LABORATORY
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SPECIALTY	NAME	PHONE 601-634-
Centrifuge Testing	Mr. Richard Ledbetter	3380
Dam Safety	Mr. Milton Myers	2640
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Swelling Soils	Dr. Richard Peterson	3737

Effective Communications

Dr. I. Thomas Sheppard has often illustrated the importance of effective communications by reference to the famous Charge of the Light Brigade in 1854. When Lord Raglan, Commander-in-Chief of the British, French, and Turkish forces, awoke to find a long line of Russian guns, 3,500 Cossacks, and 30,000 infantry facing him, he directed that an effort be made to prevent the capture of some of his own threatened artillery. The resulting message, however, did not specify which guns the enemy was to be prevented from carrying away. The message was carried finally to Lord Cardigan, Commander of the Light Brigade, who sought no clarification and interpreted the guns to be the 78 Russian cannons lined hub-to-hub across the valley. He led the suicidal charge that resulted in the loss of almost 500 of his 600 men.

Hopefully, we've never transmitted messages resulting in disasters of comparable magnitude. The Soil Mechanics Information Analysis Center aims to streamline the flow of reliable information. If you ever need clarification, please don't hesitate to call.

Upcoming Event

XIVth International Conference on Soil Mechanics and Foundation Engineering, September 6-12, 1997, Hamburg, Germany. One page abstracts are requested. For more information, write or call:

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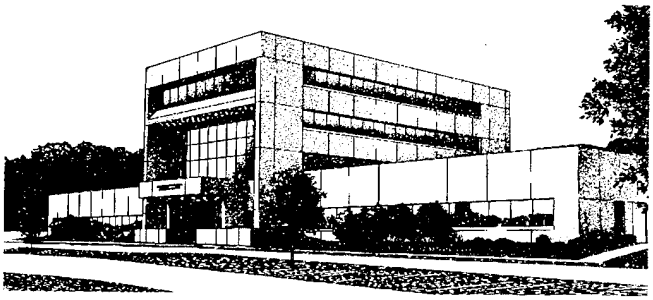
PARTIAL LISTING OF RECENT GEOTECHNICAL LABORATORY PUBLICATIONS

Report No.	Date	Title	NTIS AD Number
CR-GL-95-1	09/95	Acoustic Emission on Cofferdam Distress Warning System and Ancillary Acoustic Emission Monitoring; Melvin Price Locks and Dam (Phase III)	
MP-GL-95-2	08/95	Proceedings of the Workshop on Effects of Piles on Soil Properties	A 299 214
MP-GL-95-3	09/95	Basic Structured Documentation to the Corps of Engineers National Dam Inventory Data Update Program Based on the E-R Diagram and Structure Chart	
MP-GL-95-4	09/95	Full Waveform Inverse Modeling of Ground Penetrating Radar Data: An Initial Approach	
MP-GL-95-5	09/95	Investigation of the 26th Street Disposal Site, Edgewood Area, Aberdeen Proving Ground, Maryland	
TR-GL-95-13	08/95	A Geoscience Strategy for Cultural Resource Management Tested in an Alluvial Setting	B 203 682
TR-GL-95-15	08/95	Site Investigation of Cluster 3, Edgewood Area, Aberdeen Proving Ground, Maryland	
TR-GL-95-16	09/95	Design, Development, and Operation of the Multiport Sampler	
TR-GL-95-17		Leaky Coaxial Cable Sensor Studies	
TR-GL-95-19		Geomorphic Evaluation of Fort Leonard Wood	
TR-GL-95-20		Geomorphic Evaluation of the Oak Bend Revetment Site, Mississippi	

The reports listed above having AD numbers may be ordered from: National Technical Information Service (NTIS), U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161; telephone (703) 487-4650. Please refer to the listed AD number.



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Director

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